

Taxonomic notes on *Tricholepis radicans* (Roxb.) DC. and its allied species (Asteraceae)

L. B. Chaudhary and A. K. Pandey

Department of Botany, Bhagalpur University
Bhagalpur - 812 007, India

Abstract

T. amplexicaulis, *T. angustifolia*, *T. glaberrima* and *T. radicans* are allied and confused species. After a critical study of Indian specimens, *T. angustifolia* has been reduced as a variety under *T. glaberrima* and the correct citation of *T. radicans* has been given as *T. radicans* (Roxb.) Wight. A key to the species involved, detailed descriptions and illustrations are provided.

Tricholepis DC. (Asteraceae-Cardueae) comprises about 17 species distributed in India, Burma, China, Nepal, Bhutan, Pakistan, Afghanistan, Thailand and Iran. Critical survey of literature and specimens reveal that out of 17 species, 13 species are found in India (Wight 1834, De Candolle 1838, Clarke 1876, J. D. Hooker 1881, Dunn 1921, Kitamura 1964, Rao *et al.* 1988). During our taxonomic revision of this genus we found that the species *T. amplexicaulis*, *T. angustifolia*, *T. glaberrima* and *T. radicans* of the Section *Ochanopappus* are very much allied and taxonomically difficult. All these species are endemic to India and are distributed in Western and Southern India. After critical study of type specimens (microfiche) and specimens housed at CAL, BSD, DD and LWG, *T. angustifolia* has been reduced as a variety of *T. glaberrima*.

T. radicans is based on *Carduus radicans* Roxb. Most workers have attributed the new combination to De Candolle (1838) while it was Wight (1834) who first made this combination. So, the correct citation is *T. radicans* (Roxb.) Wight.

Key to the species

- 1a. Leaves obtuse at base; achenes distinctly ribbed;
pappus upto 3 mm long..... *T. radicans*
- b. Leaves cuneate, subamplexicaulis or amplexicaulis
at base; achenes smooth or faintly striate; pappus
absent or very minute 2.

Taxonomic notes on *Tricholepis radicans*

- 2a. Leaves amplexicaulis or subamplexicaulis at base at least in lower leaves; phyllaries distinctly spreading with very long tip, pubescent in upper portion; achenes smooth, not oblique at base; pappus absent.....1. *T. amplexicaulis*
- b. Leaves cuneate at base; phyllaries not spreading and not with very long tip, glabrous or pubescent only in inner whorls; achenes faintly striate, oblique at base; pappus absent or if present then minute.....3.
- 3a. Outer phyllaries glabrous and inner pubescent2a. *T. glaberrima* var. *glaberrima*
- b. All phyllaries glabrous.....2b. *T. glaberrima* var. *angustifolia*
1. *Tricholepis amplexicaulis* Clarke, Comps. Ind. 240. 1876; Hook. f., Fl. Brit. India 3: 381. 1881; Gamble, Fl. Pres. Madras 2: 511. 1957 (rep. ed.); Cooke, Fl. Pres. Bombay 2: 115. 1958 (rep. ed.).

Type: Canara and Mysore, *Law* s. n.; Malabar and Concan *Stocks* s. n. (syntype CAL)

T. radicans DC., Prodr. 6: 564. 1838, p.p.

(Fig. 1)

Annual, erect herbs or shrubs, up to 150 cm high, branches terete to ridged, glabrous. Leaves simple, sessile, alternate, 3.5–17 × 0.5–37 cm, reducing in size towards apex, obovate, linear-obovate, oblong-obovate or occasionally elliptic, amplexicaulis (in lower leaves) to obtuse (in upper leaves) at base, serrate all along margin or serrate to incised towards base and entire towards apex, teeth sometimes larger at base mucronate at apex, glabrous, minute hairs present along margin, black protuberances present, midrib and lateral veins raised below, lateral veins 3–13 pairs, curving towards margin. Capitulum 2.0–2.5 × 1.5–2.5 cm, terminal or occasionally axillary, solitary or very rarely paired, sessile to shortly peduncled ovoid-campanulate, truncate or rarely obtuse, at base; peduncles 0–2.3 cm long, ridged, glabrous; phyllaries 7–16 × 0.5–1.0 mm, subequal, shorter in outer whorls, tightly appressed, spreading and deflexed at tip, linear or linear ovate, entire along margin, caudate to aristate at apex, glabrous towards base, finely pubescent towards apex. Corolla pink, purple or violet, Achenes 5–6 × 1.2–2.2 mm, oblong, compressed, smooth or very faintly striate, glabrous, blackish-brown; pappus absent.

Phenology: Flowering from December through April.

L. B. Chaudhary and A. K. Pandey

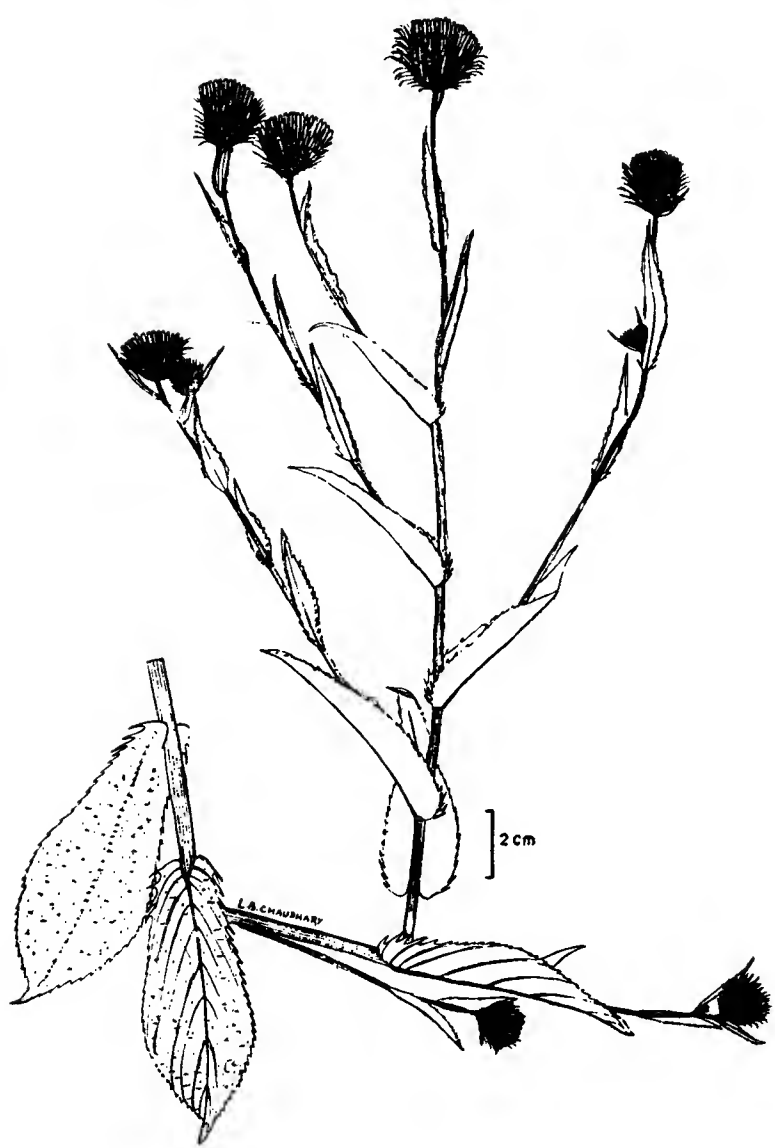


Fig. 1. *Tricholepis amplexicaulis* Clarke. A. Habit, B. Phyllaries, C. achene.

Taxonomic notes on *Tricholepis radicans*

Disribution: India (Karnataka, Kerala, Maharashtra)-endemic; in grasslands on hill slopes; Altitude 200—1350 m.

Specimens examined: KERALA: Kasaragod Dist., Periyar, 200 m, *P. Ansari* 74449 (CAL). KARNATAKA: Canara, Mysore, *W. Law* s.n., Acc. No. 2527034 A (CAL). MAHARASHTRA: Bombay state, Khandala (Poona), *S. D. M.* 30756 (CAL); Poona, *S. K. Jain* 7647 (CAL); Bombay state, Bhoma hill, *S. K. Jain* 8906 (CAL); Bhimashannar, *G. S. Puri* 12624 (CAL); Thana, Kedarnath, *K. V. Billore* 115586 (CAL); Mahabaeshwar, Lingmalla, 400 ft., *L. J. Sedgwick & T. R. D. Bell* 4628 (CAL); Malabar, Conca, *Stock, Law & C.* s.n., Acc. No. 252703 (CAL). Without Locality: Acc. No. 252704 (CAL).

Tricholepis amplexicaulis is distinguished by its robust habit, amplexicaulis leaf base, long deflexed phyllaries and smooth achenes without pappus.

2. *T. glaberrima* DC., Prodr. 6: 564. 1838; Dalz. & Gibs., Bombay Fl. 131, 315. 1861; Clarke, Comp. Ind. 240. 1876; Hook. f., Fl. Brit. India 3: 381. 1881; Gamble, Fl. Pres. Madras 2: 511. 1956 (rep. ed.); Duthie, Fl. Upp. Gang. Pl. 1: 441. 1960 (rep. ed.).

Type: India Orientali Circa. Bombay. *Roxburgh* s.n. (holotype: *n. v.* microfiche: CAL!)

Erect herbs or shrubs, 30—145 cm high; branches slender, ribbed or almost smooth, terminating in a solitary head, glabrous. Leaves 2.0—10.5 × 0.2—4.5 cm, simple, sessile, alternate, elongated-linear or linear-lanceolate, lanceolate, oblong or obovate, reduced in shape and size towards apex, cuneate at base, entire, serrate or serrulate along margin, subacuminate or acute at apex in lower leaves, aristate in upper leaves, punctate, glabrous, puberulous along margin, veins obscure, occasionally midrib and lateral veins raised below. Capitulum 2.0—2.5 cm in diam., terminal, oblong, ovoid or obovoid, subobtusate at base; peduncles 0—3 cm long, angled, glabrous; phyllaries 4—15 × 0.8—1 mm, subequal, shorter in outer whorls, appressed, erect or sometimes deflexed towards apex, narrowly ovate (in outer whorls) to oblong or narrowly lanceolate with caudate tip, glabrous in outer whorls, finely pubescent in inner whorls. Corolla red or lilac, 11 mm long, lobes 3 mm long. Stamens 7 mm long; filaments papillose-hairy. Style 9 mm long. Achenes 4—5 × 1.5 mm, oblong flat, oblique at base, smooth or faintly striate, brown, glabrous, with very minute or without pappus at truncate apex.

(a) var. *glaberrima*

(Fig. 2 A-C)

L. B. Chaudhary and A. K. Pandey



Fig. 2 A-C. *Tricholepis glaberrima* DC. var. *glaberrima*. A. Habit, B. Phyllaries, C. Achene.
Fig. 2 D-F. *Tricholepis radicans* (Roxb) Wt. D. Habit, E. Phyllaries, F. achene.

Taxonomic notes on *Tricholepis radicans*

Leaves 2.0—10.5 × 2.0—4.5 cm, obovate, lanceolate or oblong, cuneate or subamplexicaulis at base. Phyllaries glabrous in outer whorls and finely pubescent in inner whorls. Achenes with or without pappus; pappus when present minute, to 2 mm long.

Phenology: Flowering from September through November.

Distribution: INDIA (Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan)-endemic; found in waste lands near cultivated fields among grasses, at sea shore, on rocky hill slopes.

Specimens examined: KARNATAKA: N. Canara W. A. Talbot 2136 (CAL); N. Canara, Caswar, W. A. Talbot 1323 (CAL); S. Canara, Sambagi C. A. Barbar 2308 (CAL); Karwar, W. S. 6681 (CAL). MADHYA PRADESH: Mando Dist., Sonagarh, Neel Kanth forest area, Raizada et al., 13180 (LWG). MAHARASHTRA: Bombay, Dharwar, J. C. Dhruna 110 (CAL); Bombay, Ankila, J. C. Dhruna 60 (CAL); Bombay presidency, Mahd Island, J. Sinclair 4551 (CAL); Bombay, Poud, S. K. J. 7672 (CAL); Concan, s. d. Law s.n., Acc. No. 252712, 252715 (CAL); Western Ghats, T. Cooke 108 (CAL); Thana, Sawa range (Chalani forest), K. V. Billore 113203 (CAL); Thana, Ajoba hill, K. V. Billore 11965 (CAL); Poona Dist., on way to Pandongan hill, B. Reddi 93148 (CAL); Poona Dist., near Valwan dam-Lonavala, B. Reddi 1919 (CAL); Saurashtra, Sasan north towards Vasadhil hill, 1790 ft., M. B. Raizada 23726 (DD). RAJASTHAN: Mt. Abu. G. King s.n. Acc. No. 252714 (CAL); Mt. Abu, J. F. Duthie 6658 (CAL, DD); Mount Abu, 400ft., M. B. Raizada 20694 (DD).

T. glaberrima var. *glaberrima* exhibits variation in shape of leaves which vary from obovate to oblong.

var. *angustifolia* (DC.) Chaudhary & Pandey, *Comb. & Stat. nov.*

Tricholepis angustifolia DC., Prodr. 6: 564. 1838 excl. syn.; Clarke, Comp. Ind. 240. 1876; Hook. f., Fl. Brit. India 3: 382. 1881; Gamble, Fl. Pres. Madras 2: 511. 1957 (rep. ed).

Type: India Orient. ad mountes Travancorenses. Wallich s.n. (holotype: n.v., microfiche: CAL!).

Leaves 2—8 × 0.2—3.0 cm, elongated-linear or linear-lanceolate, cuneate at base. Phyllaries glabrous. Achenes with very minute or without pappus.

Phenology: Flowering from October through January.

Distribution: INDIA (Karnataka, Kerala, Rajasthan) - endemic, 200–400 ft.

L. B. Chaudhary and A. K. Pandey



Fig. 2 A-C. *Tricholepis glaberrima* DC. var. *glaberrima*. A. Habit, B. Phyllaries, C. Achene.
 Fig. 2 D-F. *Tricholepis radicans* (Roxb) Wt. D. Habit, E. Phyllaries. F. achene.

Taxonomic notes on *Tricholepis radicans*

Leaves $2.0-10.5 \times 2.0-4.5$ cm, obovate, lanceolate or oblong, cuneate or subamplexicaulis at base. Phyllaries glabrous in outer whorls and finely pubescent in inner whorls. Achenes with or without pappus; pappus when present minute, to 2 mm long.

Phenology: Flowering from September through November.

Distribution: INDIA (Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan)-endemic; found in waste lands near cultivated fields among grasses, at sea shore, on rocky hill slopes.

Specimens examined: KARNATAKA: N. Canara W. A. Talbot 2136 (CAL); N. Canara, Caswar, W. A. Talbot 1323 (CAL); S. Canara, Sambagi C. A. Barbar 2308 (CAL); Karwar, W. S. 6681 (CAL). MADHYA PRADESH: Mando Dist., Sonagarh, Neel Kanth forest area, Raizada *et al.*, 13180 (LWG). MAHARASHTRA: Bombay, Dharwar, J. C. Dhruna 110 (CAL); Bombay, Ankila, J. C. Dhruna 60 (CAL); Bombay presidency, Mahd Island, J. Sinclair 4551 (CAL); Bombay, Poud, S. K. J. 7672 (CAL); Concan, *s. d.* Law *s.n.*, Acc. No. 252712, 252715 (CAL); Western Ghats, T. Cooke 108 (CAL); Thana, Sawa range (Chalani forest), K. V. Billore 113203 (CAL); Thana, Ajoba hill, K. V. Billore 11965 (CAL); Poona Dist., on way to Pandongan hill, B. Reddi 93148 (CAL); Poona Dist., near Valwan dam-Lonavala, B. Reddi 1919 (CAL); Saurashtra, Sasan north towards Vasadhal hill, 1790 ft., M. B. Raizada 23726 (DD). RAJASTHAN: Mt. Abu, G. King *s.n.* Acc. No. 252714 (CAL); Mt. Abu, J. F. Duthie 6658 (CAL, DD); Mount Abu, 400ft., M. B. Raizada 20694 (DD).

T. glaberrima var. *glaberrima* exhibits variation in shape of leaves which vary from obovate to oblong.

var. *angustifolia* (DC.) Chaudhary & Pandey, *Comb. & Stat. nov.*

Tricholepis angustifolia DC., Prodr. 6: 564. 1838 *excl. syn.*; Clarke, Comp. Ind. 240. 1876; Hook. f., Fl. Brit. India 3: 382. 1881; Gamble, Fl. Pres. Madras 2: 511. 1957 (rep. ed).

Type: India Orient. ad mountes Travancorenses. Wallich *s. n.* (holotype: *n.v.*, microfiche: CAL).

Leaves $2-8 \times 0.2-3.0$ cm, elongated-linear or linear-lanceolate, cuneate at base. Phyllaries glabrous. Achenes with very minute or without pappus.

Phenology: Flowering from October through January.

Distribution: INDIA (Karnataka, Kerala, Rajasthan) - endemic, 200-400 ft.

L. B. Chaudhary and A. K. Pandey

Specimens examined: KARNATAKA: S. Canara, Parappa, 200 ft., C. E. C. Fischer 4519 (CAL); S. Canara, Jahlsur Anon, 2419 (CAL); Mysore, Shimoga, Anon, 7031 (CAL); Tellichery, A. Meebold 12083 (CAL); S. W. Canara Dist, Bhatkal, M. B. Raizada 21075 (DD); Canara div., M. B. Raizada 21085 (DD).

3. *Tricholepis radicans* (Roxb.) Wight, Contr. Bot. Ind. 25. 1833; DC., Prodr. 6: 564. 1838; Dalz. & Gibs., Bombay Fl. 131. 1861; Clarke, Comp. Ind. 240. 1876; Hook. f., Fl. Brit. India 3: 381. 1881; Gamble, Fl. Pres. Madras 2: 726. 1921; Cooke, Fl. Pres. Bombay 2: 114. 1958 (rep. ed.); Ramamoorthy in Sald. & Nicols. Fl. Hassan Dist. 625. 1976; Rao & Razi, Syn. Fl. Mysore Dist. 549. 1981; Rani & Matthew in Matthew, Fl. Tamil Nadu Carnatic I: 821. Pl. 54 b. 1983.

Carduus radicans Roxb., Fl. Ind. 3: 408. 1832.

Type: In agro Maderaspatano Roxb. Wall. et Malabarico (Belang) (syntype *n. v.* microfiche: CAL)

(Fig. 2 D-F)

Annual, erect herbs, 9–40 cm high, branches slender, terete towards base, angular towards apex, striate, glabrous. Leaves simple, sessile, alternate, 2.0–6.3 × 0.3–2.0 cm, basal ones spatulate, upper, oblong-obovate, oblong-ovate, oblong or linear, obtuse at base, serrate or pinnatifid along margin, teeth acute, mucronate or with a spine, rounded, subobtuse or acute, with or without a spine at apex, glabrous with very minute hairs along margin, covered with raised points, veins obscure or sometimes prominent below. Capitulum 1–2 cm, terminal, solitary, globose or conical, cuneate to rounded or occasionally truncate at base, homogamous; peduncles 1–3 cm long, slender, striate, glabrous. Phyllaries 6.5–8 × 0.7–1 mm, unequal, multiseriate, imbricate, tightly appressed or reflexed at apex, stiff, linear-subulate, to lanceolate, acuminate at apex, entire, glabrous towards base, pubescent towards apex, ciliate. Corolla 9–11 mm long, pink, purple, red or blue, tube 5.5 mm long, narrowly cylindric, broadened above; lobes 5.3 mm long, papillose-hairy. Anthers 4.3 mm long, linear with acute tip, sagittate. Ovary 2 mm long, narrowly oblong; style 9 mm long, shortly bifid; stigma terminal. Achenes 5 × 1.5 mm oblong, subcompressed, closely ribbed, truncate at apex, oblique at base, glabrous, shining, yellowish-brown. Pappus minute, to 3.5 mm long, unequal, shorter in outer whorls, free, linear, flat, ciliate (fimbriate).

Phenology: Flowering from September through December.

Taxonomic notes on *Tricholepis radicans*

Distribution: India (Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu)-endemic; on the side of paddy fields, in poor dry, loamy and humus soils associated with grasses and Bajri crops; 30-1200 m.

Specimens examined: ANDHRA PRADESH: Chittoor Dist., Mekalavani-Kunta, 400 m. G. V. S. Rao 46859 (CAL), KARNATAKA: Mysore, A. Meebold 11403 (CAL). MAHARASHTRA: Bombay, Poona, law College hill, J. A. V 4838 (CAL); Dongergaon, Ahmadnagar Dist., 2000, Nana 6268 (CAL); Raghunath wadi, Alibag, D. K. Kamat 27019 (CAL); Malabar Concan, Stocks s.n., Acc. No. 252698 (CAL); Bombay, Katraj ghat, R. M. Patil 5784 (CAL); Baramati, D. K. Kamat 27001 (CAL); Poona. Univ. campus, R. S. Raghavan 64259 (CAL); Poona, College of Science, 1893 Anon. s.n. (DD). TAMILNADU: Vedicherla, Nellor Dist., C. E. C. Fischer 4205 (CAL); Coimbatore, Hassanur, 3300, C. E. C. Fischer 800 (CAL); Santaveri ghat Babab, 3500', A. Meebold 9494 (CAL); Madurai, Nozannor, N. L. Bor 7579 (DD); Cuddapuh, E. K. Khusrain s.n. (DD). Without locally: Herb Wight 1669 (CAL).

In many characters *T. radicans* resembles *T. amplexicaulis*, *T. angustifolia* and *T. glaberrima*, but can be easily identified by its achenes and pappus. Besides the leaves of *T. radicans* also somewhat differ from those of other species.

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